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THE NATION

Big Kid on the Cosmic Block a Wimpy Beast

■ Astronomers get first day-to-day look at the black hole living in Milky Way's core. It's huge, weak and a dainty eater, scientists say.

By Usha Lee McFarling, Times Staff Writer

Snapping the most detailed images yet of the center of the Milky Way, astronomers have captured their first glimpses of the day-to-day life of the monstrous black hole residing at our galaxy's core. They reveal a temperamental and somewhat wimpy beast that appears to be starving.

Black holes -- space and time twisters that personify the extremes of physics -- are among the most mysterious objects in the universe. Our neighborhood black hole is no exception. The new close-up view reveals a host of contradictions: The black hole is bigger than 3 million suns, yet it is so weak that one astronomer describes it as "a cowardly lion." And rather than slurping up massive gulps of gas and stars like normal black holes, this one appears to be on a starvation diet, subsisting only on dainty snacks of stellar wind.

"It's really quiet, uncomfortably quiet," said Mark R. Morris, a UCLA astronomer and co-leader of the team that announced the findings Monday at the annual meeting of the American Astronomical Society in Seattle.

The finds are a prodigious leap in the study of a cosmic body that four years ago existed only in theory. Now, having proved that the black hole does exist, scientists are probing its most intimate details, watching it eat and burp and, at times, suffer for lack of food.

"We are getting a look at the everyday life of a super-massive black hole like never before," said Frederick K. Baganoff, an astronomer from the Massachusetts Institute of Technology and study co-leader.

Its daily behavior is surprising seasoned astronomers, who say this black hole, unlike any other yet found, sends out X-ray flares nearly every day.

The flares, Morris said, may be key to understanding the black hole's "event horizon" -- the point of no return from which light and matter are doomed to disappear from the familiar universe. Until now, this realm has been the domain of science-fiction novelists and theorists, not astronomers who make observations.

"People have theorized ad infinitum about the event horizon," said Morris. "Here we have a good chance at seeing what's really going on in this strange region."

Black holes are objects so dense and compact that not even light can escape their gravitational pull. They suck in matter -- gas, dust, stars, planets -- like giant vacuums. As the material is being engulfed, it sends out a final, dying scream in the form of pulses of bright X-ray light.

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**La Opinión**

Because of this, black holes with a healthful diet are quite bright when examined with such X-ray telescopes as NASA's Chandra. But the black hole in the Milky Way has been strangely dim, suggesting that there may be little in the vicinity to munch on or that it may be a fussy eater, turning its nose up at what comes its way.

In late 2001, a huge X-ray flare came out of the center of the galaxy -- about the size you'd expect if a black hole had gobbled up a comet or an asteroid. The finding cinched the case for its existence. The black hole, dubbed Sagittarius A because it is in the direction of the constellation Sagittarius, is about 27,000 light-years from Earth. It is too far away to pose any hazard to our planet but close enough to study.

The new studies examined the black hole over a period of two weeks. Most of the time, it sat quietly, emitting X-ray energy about equal to that put out by our sun. But about once a day, it flared up intensely, 50 times brighter than its normal glow. These flares, said Morris, are the hallmarks of a snacking black hole. Since there is little floating around nearby to eat, the snacks probably consisted of particles streaming off young stars in the vicinity, Morris said.

The frequent, short flares are puzzling behavior for black holes, which normally shoot out very intense but intermittent blasts, Baganoff said.

Although relatively calm now, our black hole spawned tremendous violence in the past. Morris found huge lobes of 36-million-degree gas that extend out, in an hourglass shape, for dozens of light-years on each side of the black hole. The gas appears to be the product of massive explosions -- perhaps from a time when the black hole swallowed entire stars -- and likely occurred repeatedly over the last 10,000 years, he said.

Morris' team also found a streak of X-ray light, or a jet of high energy particles, that appears to be coming from the black hole. Most black holes have jets, but none had been detected near Sagittarius A. To Morris, it was a glaring omission. "Now, our black hole can join the club," he said. "It's just the kind of jet you'd expect to see from any self-respecting black hole."

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